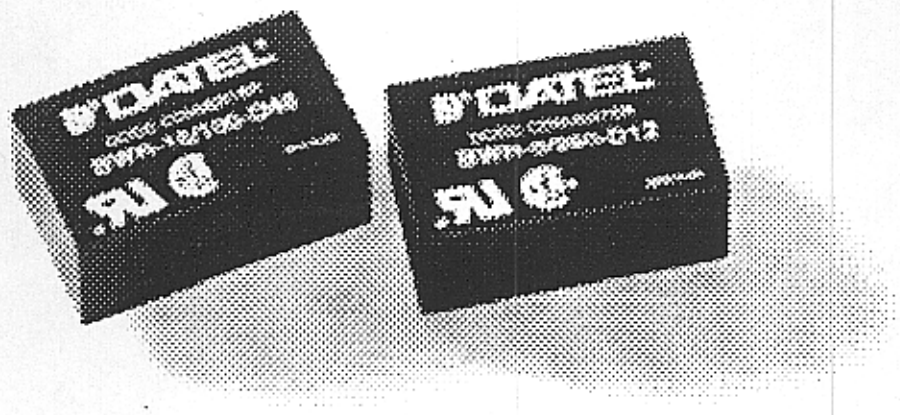
P/N 137269

DATEL®
INNOVATION and EXCELLENCE



Dual Output
BWR Models

Low-Cost, DIP Packaged 3 Watt, DC/DC Converters

Features

- **Low cost!**
- **±5, ±12 or ±15 Volt outputs**
- **Choice of 3 input voltage ranges:**
  - **4.5 - 9 Volts**
  - **9 - 18 Volts**
  - **18 - 72 Volts**
- **1.25" x 0.8", 24-pin DIP form factor**
- **Industry-standard package and pinout**
- **Internal input/output filtering**
- **No external components required**
- **Fully isolated, 1000Vdc guaranteed**
- **Guaranteed efficiencies to 80%**
- **–25 to +75°C operation with no derating**
- **UL 1950, CSA 22.2 No. 234 and IEC 950**
- **EMI/EMC characterized**
- **Modifications and customs for OEM's**

Packaged in industry-standard DIP's, the 3 Watt dual-output models of DATEL's XWR Series DC/DC converters are fully regulated (±0.5% max. line, ±1% max. load), fully isolated (1000Vdc minimum), extremely efficient (as high as 80% guaranteed) building blocks providing true component-like flexibility and convenience to designers of modern distributed power systems.

Exploiting high-frequency (200kHz), current-mode topologies and contemporary SMT assembly techniques, BWR Model DC/DC's have enough room to include input (pi type) and output filters within their package. Offering true "plug-and-play" convenience, these power converters require no external components. They operate over the full –25 to +75°C temperature range with no output power derating.

Output voltages are either ±5, ±12 or ±15 Volts. Input voltage ranges are either 4.5-9V ("D5" models), 9-18V ("D12" models) or an ultra-wide 18-72V ("D48" models). Transient response time is a quick 200µsec.

These extremely rugged modules are fully encapsulated with a new, thermally conductive, potting compound. They are moisture and vibration resistant and have established a reputation for outstanding MTBF. For telecommunication, computer and other EMI-sensitive applications, these are the only DIP-packaged DC/DC's offering full EMI/EMC characterization data.

Industry-standard pinouts make DATEL's BWR Model 3W DC/DC's ideal replacements for other more costly, less reliable power converters. Similarly, they are excellent choices for original design-ins in systems demanding small size, low cost and high reliability.

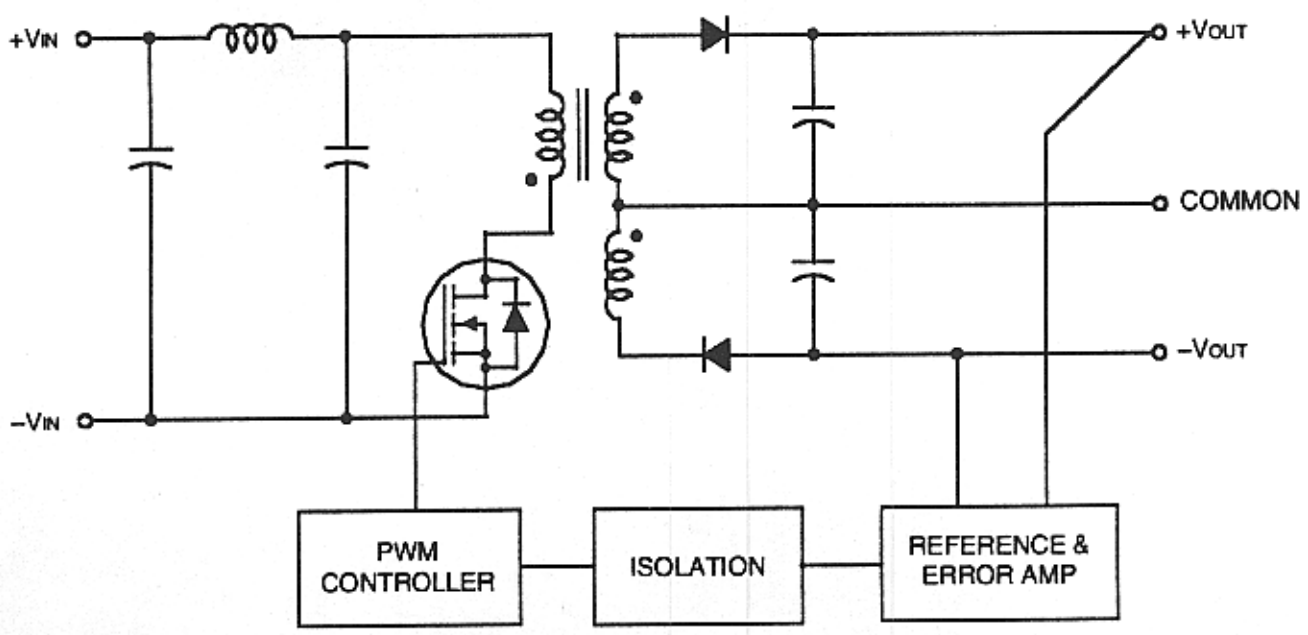


Figure 1. Simplified Schematic

Performance Specifications and Ordering Guide ①

Model	Output					Input			Efficiency (Min.)	Package (Case, Pinout)
	V_{OUT} (Volts)	I_{OUT} (mA, Max.)	Ripple/Noise ② (mVp-p, Max.)	Regulation (Max.) Line	Regulation (Max.) Load ③	V_{IN} Nom. (Volts)	Range (Volts)	I_{IN} ④ (mA, Max.)		
BWR-5/250-D12	±5	±250	120	±0.5%	±1.0%	12	9-18	35/278	75%	C1, P2
BWR-5/250-D48	±5	±250	120	±0.5%	±1.0%	48	18-72	10/76	75%	C1, P2
BWR-12/105-D5	±12	±105	150	±0.5%	±1.0%	5	4.5-9	75/727	70%	C1, P2
BWR-12/125-D12	±12	±125	150	±0.5%	±1.0%	12	9-18	35/346	73%	C1, P2
BWR-12/125-D48	±12	±125	150	±0.5%	±1.0%	48	18-72	10/81	78%	C1, P2
BWR-15/85-D5	±15	±85	150	±0.5%	±0.5%	5	4.5-9	100/736	70%	C1, P2
BWR-15/100-D12	±15	±100	150	±0.5%	±1.0%	12	9-18	35/346	73%	C1, P2
BWR-15/100-D48	±15	±100	150	±0.5%	±1.0%	48	18-72	10/81	80%	C1, P2

① Typical at T_A = +25°C under nominal line voltage and full-load conditions unless otherwise noted.
② Ripple/Noise (R/N) measured over a 20MHz bandwidth.
③ Balanced loads, 10% to 100% load.
④ Nominal line voltage, no-load/full-load conditions.

Part Number Structure

B WR - 15 / 10C - D48

Output Configuration:
B = Bipolar

Wide Range Input

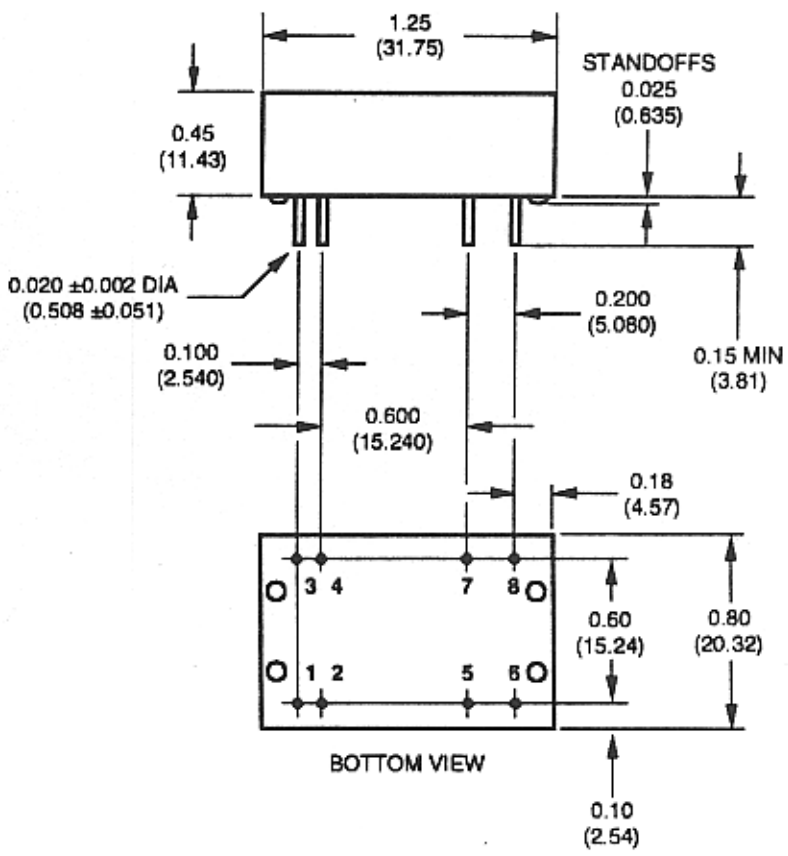
Nominal Output Voltages:
±5, ±12 or ±15 Volts

Maximum Output Current
in mA from each output

Input Voltage Range:
D5 = 4.5-9 Volts (5V nominal)
D12 = 9-18 Volts (12V nominal)
D48 = 18-72 Volts (48V nominal)

Mechanical Specifications

Case C1



I/O Connections	
Pin	Function P2
1	+Input
2	+Input
3	–Input
4	–Input
5	Common
6	+Output
7	Common
8	–Output

Performance/Functional Specifications

Typical @ T_A = +25°C under nominal line voltage and full-load conditions unless noted. ①

Input	
Input Voltage Range:	
"D5" Models	4.5-9 Volts (5V nominal)
"D12" Models	9-18 Volts (12V nominal)
"D48" Models	18-72 Volts (48V nominal)
Input Current	See Ordering Guide
Input Filter Type ②	Pi
Reverse-Polarity Protection	Yes (Instantaneous, 2A maximum)
Output	
V_{OUT} Accuracy (50% load)	±1%, maximum
Temperature Coefficient	±0.02% per °C
Ripple/Noise (20MHz BW) ②	See Ordering Guide
Line/Load Regulation	See Ordering Guide
Efficiency	See Ordering Guide
Isolation Voltage ③	1000Vdc, minimum
Current Limiting	Auto-recovery
Dynamic Characteristics	
Transient Response (50% load step)	200µsec to ±1% of final value
Switching Frequency	200kHz
Environmental	
Operating Temperature ④ (Ambient, no derating)	–25 to +75°C
Storage Temperature	–40 to +100°C
Physical	
Dimensions	1.25" x 0.8" x 0.45" (31.8 x 20.3 x 11.4mm)
Case Material	Diallyl phthalate
Pin Material	Brass, solder coated
Weight	0.5 ounces (14.2 grams)

① These power converters require a minimum 10% loading to maintain specified regulation. Operation under no-load conditions will not damage these devices, however, they may not meet all listed specifications.

② Application-specific internal input/output filtering can be added upon request. Contact DATEL Applications Engineering for details.

③ Devices can be screened or modified for higher guaranteed isolation voltages. Contact DATEL Applications Engineering for details.

④ Devices can be screened for lower-temperature operation. Contact DATEL Applications Engineering for details.

Absolute Maximum Ratings

These are stress ratings. Exposure of devices to any of these conditions may adversely affect long-term reliability. Proper operation under conditions other than those listed in the Performance/Functional Specifications Table is not implied. Storage temperatures have been verified for 168 hours.

Input Voltage:	
"D5" Models	12 Volts
"D12" Models	20 Volts
"D48" Models	80 Volts
Input Reverse-Polarity Protection	Current must be <2A. Brief duration only. Fusing recommended.
Output Overvoltage Protection	None
Output Current	Current limited. Max. current and short-circuit duration are model dependent.
Storage Temperature	–40 to +100°C
Lead Temperature (soldering, 10 sec.)	+300°C

Technical Notes

Floating Outputs

Since these are isolated DC/DC converters, their outputs are "floating." Any BWR model may be configured to produce an output of 10V, 24V or 30V (for ±5V, ±12V or ±15V models, respectively) by applying the load across the +Output and –Output pins (pins 6 and 8), with either output grounded. The Common (pins 5 and 7) should be left open. Minimum 20% loading is recommended under these conditions.

Filtering and Noise Reduction

All BWR 3 Watt DC/DC Converters achieve their rated ripple and noise specifications without the use of external input/output capacitors. In critical applications, input/output ripple and noise may be further reduced by installing electrolytic capacitors across the input terminals and/or low-ESR tantalum or electrolytic capacitors across the output terminals. Output capacitors should be connected between their respective output pin (pin 6 or 8) and Common (pins 5 and 7) as shown in figure 2. The caps should be located as close to the power converters as possible. Typical values are listed in the tables below. In most applications, using values greater than those listed will yield better results.

To Reduce Input Ripple

"D5" Models	47µF, 15V
"D12" Models	10µF, 35V
"D48" Models	4.7µF, 100V

To Reduce Output Ripple

±5V Outputs	47µF, 10V, Low ESR
±12/15V Outputs	22µF, 20V, Low ESR

In critical, space-sensitive applications, DATEL can easily tailor the internal input/output filtering of these devices to meet your specific requirements. Contact our Applications Engineering Group for additional details.

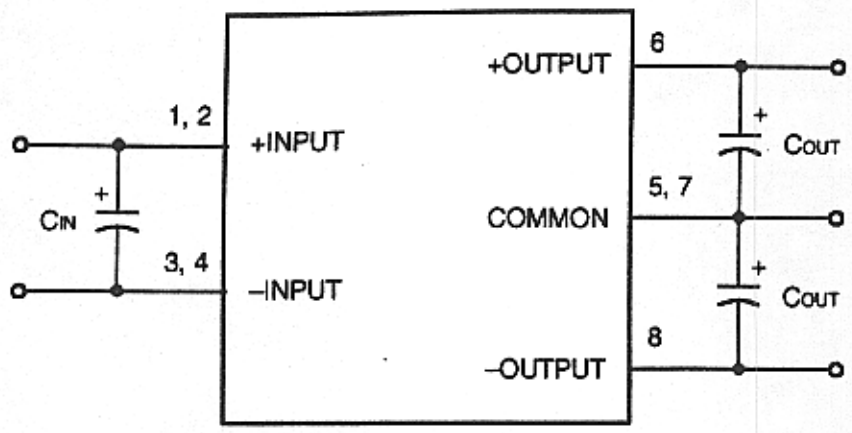


Figure 2. Using External Capacitors to Reduce Input/Output Noise/Ripple

Input Fusing

Certain applications and/or safety agencies may require the installation of fuses at the inputs of power conversion components. For DATEL BWR 3 Watt DC/DC Converters, you should use slow-blow type fuses with values no greater than the following:

V_{IN} Range	Fuse Value
"D5"	1.5A
"D12"	1A
"D48"	0.5A

Custom Capabilities

DATEL's world-class design, development and manufacturing team stands ready to work with you to deliver the exact power converter you need for your demanding, large volume, OEM applications. And ... we'll do it on time and within budget!

Our experienced applications and design staffs; quick-turn prototype capability; highly automated, SMT assembly facilities; and in-line SPC quality-control techniques combine to give us the unique ability to design and deliver any quantity of power converters to the highest standards of quality and reliability.

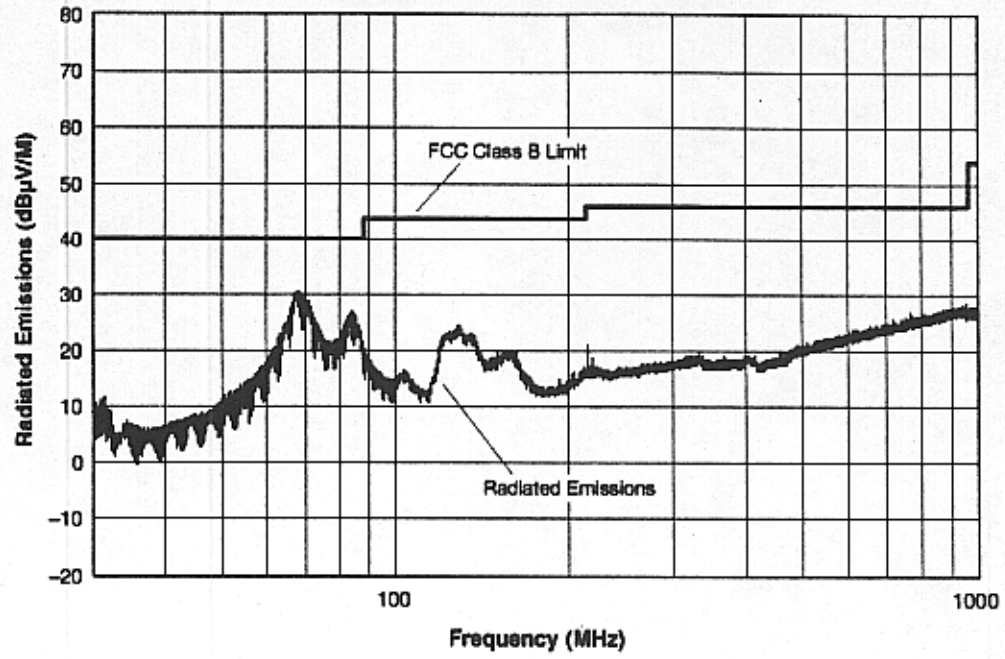
We have compiled a large library of DC/DC designs that are currently used in a variety of telecom, medical, computer, railway, aerospace and industrial applications. We may already have the converter you need.

Contact us. Our goal is to provide you the highest-quality, most cost-effective power converters available.

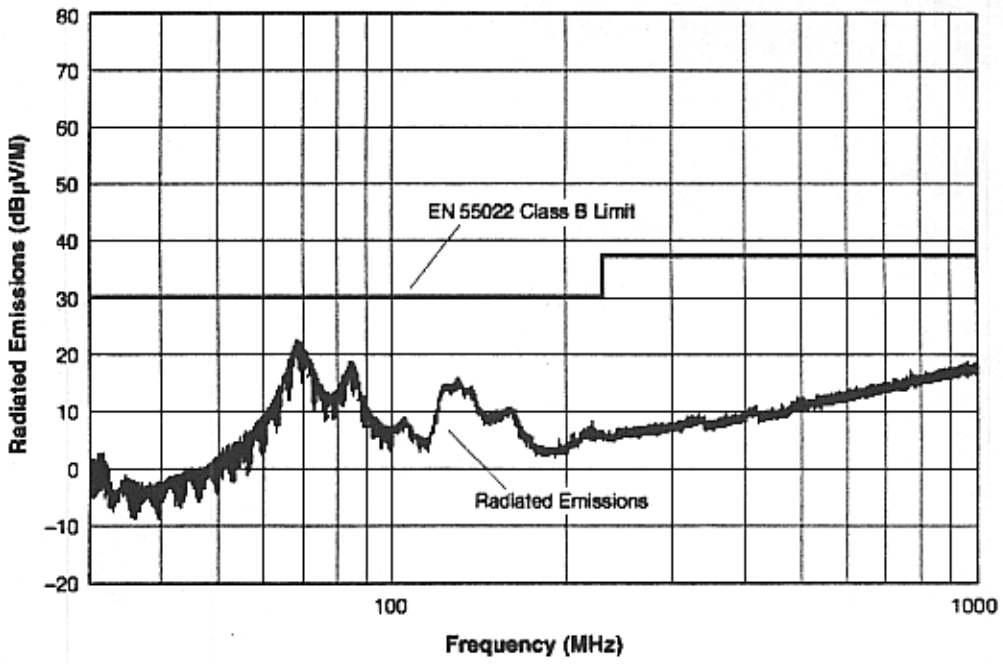
EMI Radiated Emissions

If you're designing with EMC in mind, please note that all of DATEL's BWR 3 Watt DC/DC Converters have been characterized for radiated and conducted emissions in our new EMI/EMC laboratory. Testing is conducted in an EMCO 5305 GTEM test cell utilizing EMCO automated EMC test software. Radiated emissions are tested to the limits of FCC Part 15, Class B and CISPR 22 (EN 55022), Class B. Correlation to other specifications can be supplied upon request. Radiated emissions plots to FCC and CISPR 22 for model BWR-5/250-D12 appear below. Published EMC test reports are available for each model number. Contact DATEL's Applications Engineering Department for more details.

BWR-5/250-D12 Radiated Emissions
FCC Part 15 Class B, 3 Meters
Converter Output = ±5Vdc @ ±203mA



BWR-5/250-D12 Radiated Emissions
EN 55022 Class B, 10 Meters
Converter Output = ±5Vdc @ ±203mA



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ISO 9001 REGISTERED

DS0317A 6/97

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Derating Curves for 10W and 20W Models

10 WATT MODELS (C2)	DERATING CURVE
BWR-5/700-D5	D
BWR-5/800-D12	C
BWR-5/700-D48	E
BWR-12/335-D5	C
BWR-12/415-D12	A
BWR-12/415-D48	B
BWR-15/275-D5	C
BWR-15/330-D12	A
BWR-15/330-D48	B

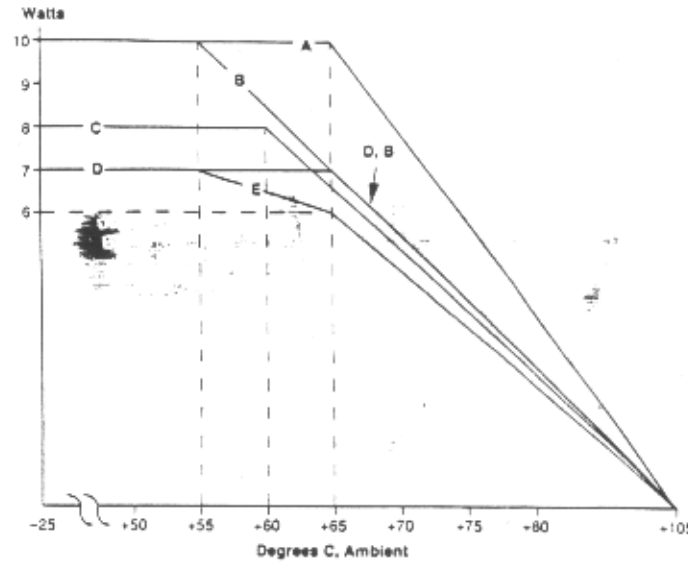


Figure 4a.
Typical 10 Watt BWR Models Derating Curves

20 WATT MODELS (C4)	DERATING CURVE
BWR-5/1500-D5	H
BWR-5/1700-D12	G
BWR-5/1700-D48	G
BWR-9/850-D5	H
BWR-12/625-D5	H
BWR-12/830-D12	F
BWR-12/830-D48	F
BWR-15/500-D5	H
BWR-15/670-D12	F
BWR-15/670-D48	F

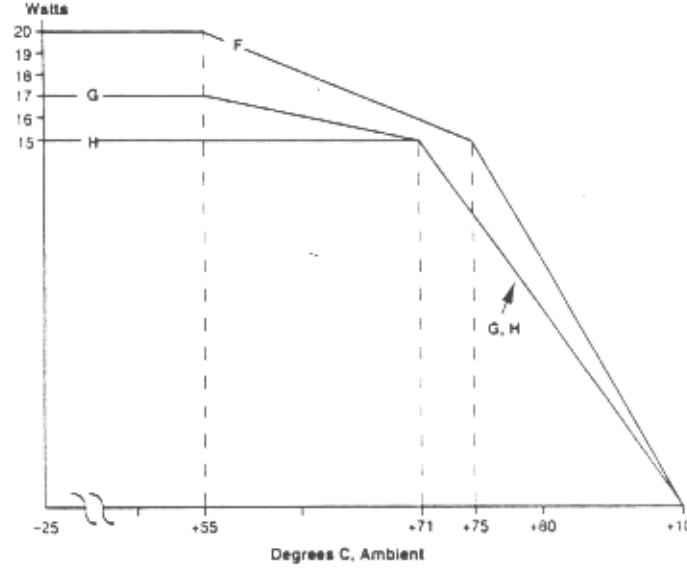


Figure 4b.
Typical 20 Watt BWR Models Derating Curves

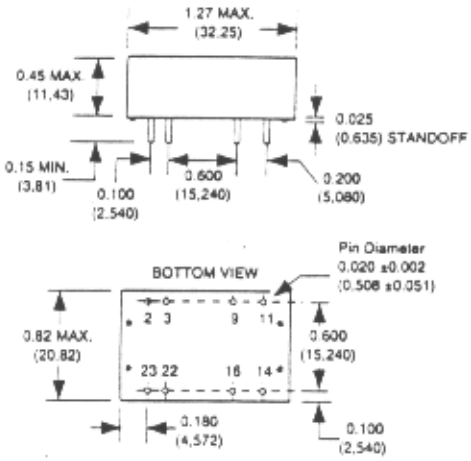
Table 4. I/O Connections

PIN*	C1 FUNCTION	PIN	C2 FUNCTION	PIN	C4 FUNCTION
1	+INPUT	1	+INPUT	1	+INPUT
2	+INPUT	2	–INPUT	2	–INPUT
3	–INPUT	3	+OUTPUT 1	3	NO PIN
4	–INPUT	4	COMMON	4	CONTROL
5	COMMON	5	–OUTPUT 2	5	+OUTPUT 1
6	+OUTPUT 1		—	6	COMMON
7	COMMON		—	7	–OUTPUT 2
8	–OUTPUT 2		—	8	TRIM

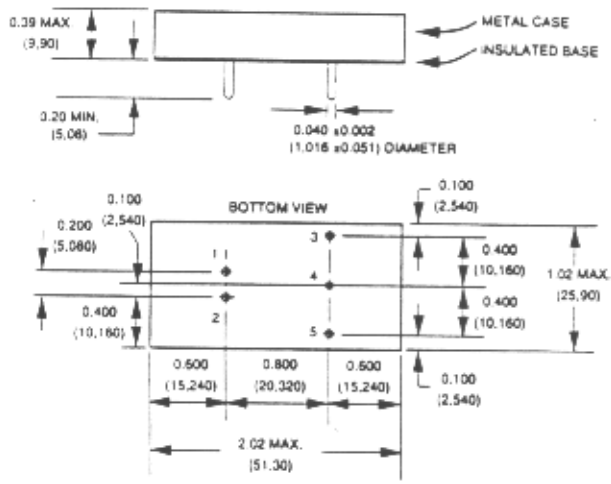
★ Pins 1 and 2, 3 and 4, and 5 and 7 are internally connected.

MECHANICAL DIMENSIONS

C1 (3W) Models

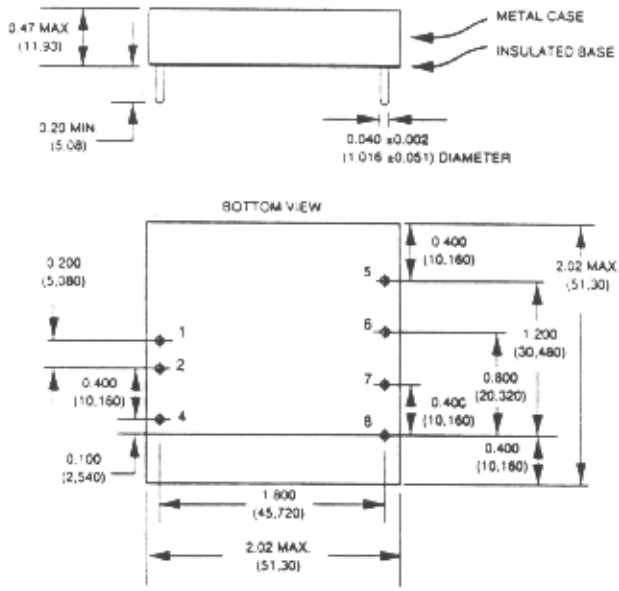


C2 (10W) Models



Notes:
Dimensions in inches (mm)
Tolerances: 2 Places ±0.02 (±0,51)
3 Places ±0.010 (±0.254)

C4 (20W) Models



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DOCUMENTATION *UPDATE*

CHECK YOUR DOCUMENT

XWR Series, Dual Output [DS-0276A (9/93)]

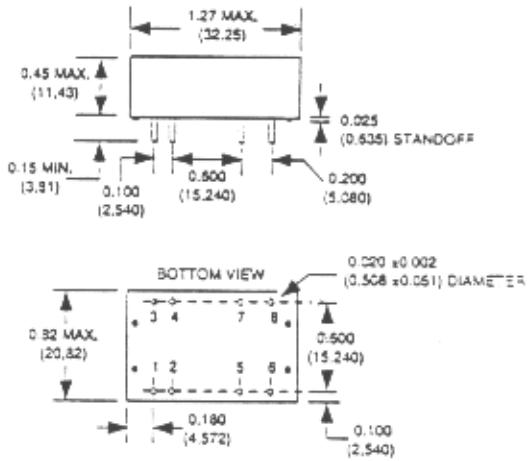
The Data Sheet for this group of products was published with an error relating to pin numbers for the C1 (or 3W) models only. The correct pin numbers, and their respective signals, are shown below:

I/O Connections, 3W Models

PIN *	C1 FUNCTION
1	+INPUT
2	+INPUT
3	–INPUT
4	–INPUT
5	COMMON
6	+OUTPUT 1
7	COMMON
8	–OUTPUT 2

* Pins 1 and 2, 3 and 4, and 5 and 7 are internally connected.

C1 (3W) Models



Notes:
Dimensions in inches (mm)
Tolerances: 2 Places ±0.02 (±0.51)
3 Places ±0.010 (±0.254)

The signal names shown in Table 4, I/O Connections, in the Data Sheet are correct. The *pin numbers only* in the mechanical dimension drawing are, however, incorrect. Please refer to the illustration above for the correct pin number assignments.